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Farmers' Bulletin 2039

ELECTRIC BROODING

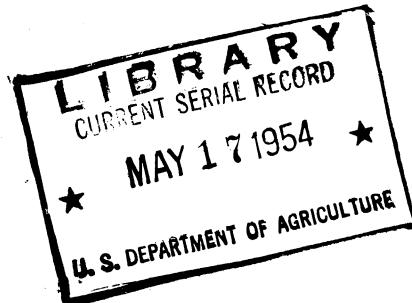
SAVES PIGS



SAVES LAMBS



SAVES FEED



ELECTRIFIED FARMING - MORE PRODUCTION

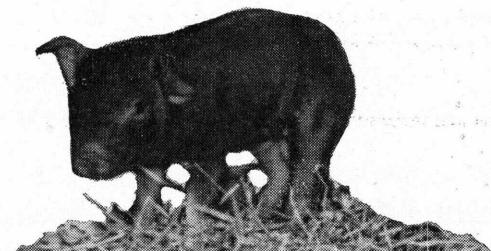
U. S. DEPARTMENT OF AGRICULTURE

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THE purpose of this bulletin is to pass on to all farmers some of the most effective and practical uses of electric heat and light recently developed, as they pertain to the brooding of pigs, lambs, and other livestock. Farmers are finding that electricity used effectively can help them *produce more*, to *save more* of what they produce for market, and to *obtain more profit* from their farm production. The present emergency demands that farmers *produce more* and *waste less* to meet the Nation's food and fiber production requirements.

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**SAVE MORE PIGS, LAMBS, AND FEED
BY USING ELECTRIC HEAT AND LIGHT.**

ELECTRIC BROODING

SAVES PIGS, SAVES LAMBS, SAVES FEED

Prepared by the Rural Electrification Administration

By D. W. TEARE

Farm Electrification Specialist

EACH year 30 to 40 percent of the pigs farrowed and 15 to 30 percent of the lambs dropped are lost because of crushing, cold weather, dampness, disowning, malnutrition, and other causes. At least *half* these losses can be prevented by the use of electric light and heat at the time of the animals' birth and for the first 2 weeks of the young animals' lives. Sows and ewes must be kept and fed during the winter months. Loss of young animals is also therefore a waste of feed.

Reducing losses in young livestock is the fastest, cheapest, and most effective method of increasing meat, wool, and leather production.

FOR INCREASED PIG PRODUCTION

A very successful hog producer in Indiana uses either a 500-watt, ring-shaped, black heat element with a metal reflector, or a 250-watt heat lamp in each farrowing pen to warm the sow for several hours before and during farrowing. The heating unit is suspended over the sow while she is farrowing the pigs. This lamp is turned off after the pigs have been taught to go to a corner brooding unit. The heat lamp over the sow warms her back and tends to make her less nervous and restless. Because of the heat, sows are warm and comfortable and therefore frequently give birth to the entire litter lying down. When the sow does not get up and down, there is practically no loss of pigs from crushing during and immediately after birth. The pigs also benefit from this heat because chilling is prevented.

As quickly as possible the young pigs are taught to go to a 250-watt heat-lamp brooder for safety. The brooding lamp is hung in one corner of the farrowing pen. This lamp keeps the pigs in the corner much of the time out of danger from being crushed by the sow. A 125-watt heat lamp can be used when the weather is mild or as the

pigs get older. The young pigs soon know where to keep dry and warm. Because of the effectiveness of these two heating units, this Indiana farmer is able to raise as many as 800 pigs with 100 sows. This is an average of 8 pigs per litter. Without electric brooding equipment, it would be almost impossible to raise this number of pigs per sow.

HOVER-TYPE PIG BROODERS

Pig brooder hovers can be built of wood or metal in triangular or other shape for fitting into the corner of the usual farrowing pen. This type of brooder should be equipped with a regular 100-watt inside frosted incandescent electric lamp. *Do not* use a *heat lamp* in a hover brooder as there is danger of starting a fire in the bedding. An *incandescent lamp* is the type ordinarily used for lighting. From 88 to 94 percent of the current consumed by the lamp is given off as heat. *It is recommended* for hover-type brooding.

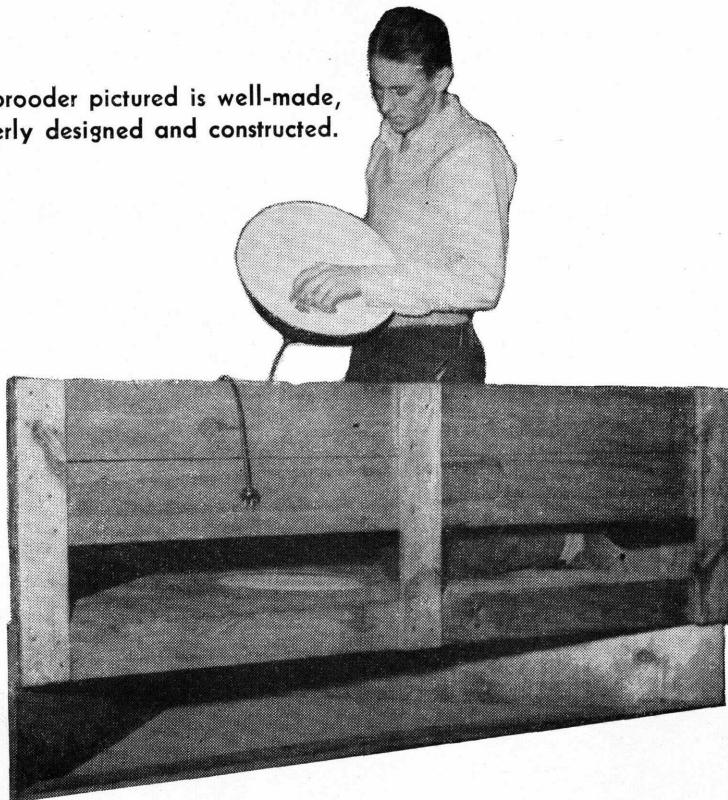
The incandescent bulb should be fitted in a reflector with a white lining which has a diameter of at least 14 inches. (See materials for the hover brooder on page 8.)

A protective screen is placed under the top of the brooder to prevent straw or other bedding from coming in contact with the lamp and starting a fire.

The extension cord to the brooder should be the heavy-duty type. Lightweight cords are more likely to become worn and frayed, resulting in a short that would burn out the fuse or start a fire. A fence should be built on top of the brooder along the front. This will prevent the sow from getting on top of the brooder, or from rooting the lamp reflector out of position, or from chewing the extension cord. Sows have been known to chew the extension cord and were electrocuted when their teeth penetrated the insulation.

The brooder box should be securely fastened in place to prevent the sow from rooting it out of position. Follow the construction details so that the pig-brooder box will be rugged enough to withstand anything the sow might do to break it up.

The brooder pictured is well-made, properly designed and constructed.



POINTS IN SUCCESSFUL PIG BROODING

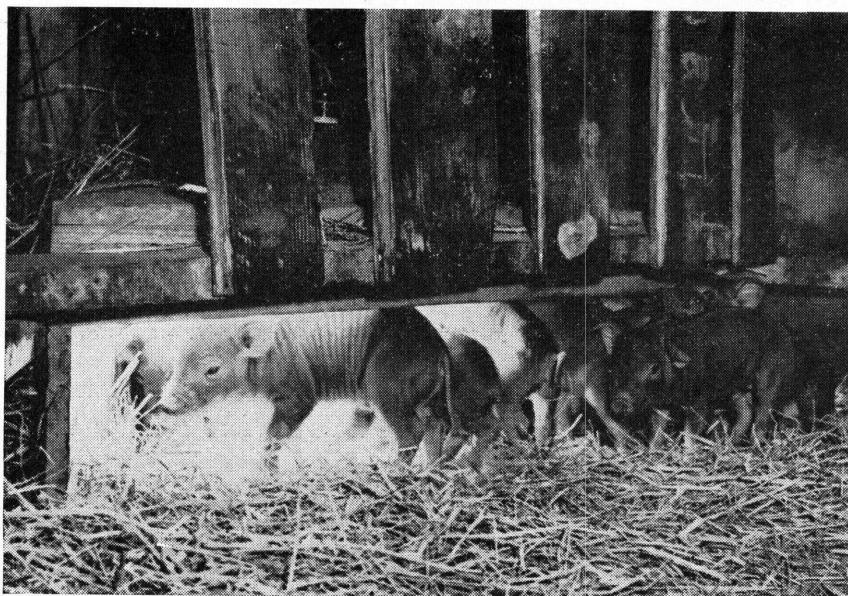
You will find the following points helpful in successful use of hover-type pig brooders:

1. Place the brooder and sow in a pen at least 1 day before farrowing and have the lamp on at least 1 day before the pigs arrive. This warms the floor and the litter or bedding.
2. In very cold weather block the brooder entrance for several hours after the pigs are first placed in it. The pigs will then get warm and dry quickly. After they have been let out a time or two to nurse and returned to the brooder, they will learn to find their way back without help.
3. Keep the lamp burning continuously for *10 days* to 2 weeks. In Northern States it may be necessary to keep the heat on longer and to use a 150-watt incandescent lamp.

4. Make a brooder for each sow. Otherwise you may be short of brooders if several sows farrow within a few hours time.
5. Use new lamps in the brooder each year. This will tend to prevent lamp failures during the brooding period.

ADVANTAGES OF A HOVER-TYPE PIG BROODER

1. It provides a safe nest where the pigs are out of the sow's way.
2. The hover will hold the body heat of the pigs. This helps to protect them in case the electric heat is cut off for a while.
3. The cost of current is small; ranging from 25 to 75 cents per litter for a 10-day brooding period.
4. The lamp, reflector, and extension cord can be used for other purposes after the farrowing season.
5. The pig brooder can be used as a lamb brooder by making side-boards to fit under the brooder to increase its height to 24 or 30 inches.
6. It will save an average of at least three pigs in two litters.



Pigs seek the heat and are protected from chilling or crushing.

DISADVANTAGES OF A HOVER-TYPE PIG BROODER

1. Requires more lumber for construction than a heat-lamp brooder.
2. Costs somewhat more to build than a heat-lamp brooder.
3. More difficult to sterilize than a heat-lamp brooder. It must be sterilized if it is used with succeeding litters of pigs.

BROODING WITH INFRARED HEAT LAMPS

The use of heat lamps is a new method of brooding. A heat lamp produces infrared rays, which pass through the air without loss of heat. The rays produced by the lamp heat are efficient in warming and drying young animals and the bedding. The result is similar to that one obtains by lying in the sun in a sheltered spot on a cold day. Young animals also like this method of getting warm.

A brooder box, or hover, is not used and consequently the animals chill more quickly if the lamps are out. The heat-lamp method of brooding is excellent in case the sows farrow before the box brooders are ready or if other emergencies occur.

Heat lamps are made in 125-, 250-, and 375-watt sizes. Either of the two smaller sizes is generally used for pig brooding. They have a burning life of about 5,000 hours, which is nearly seven times the average life of ordinary lighting lamp.

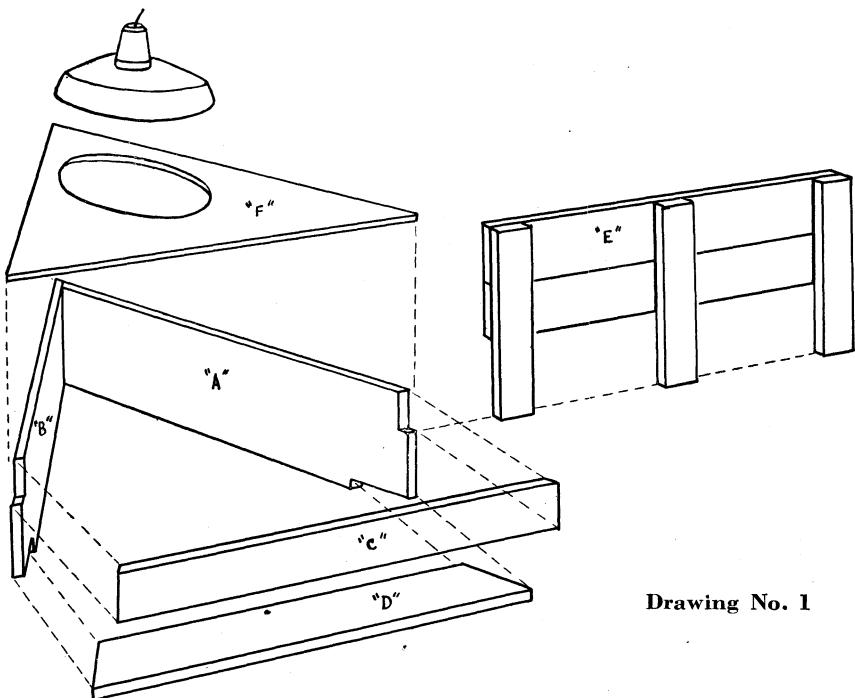
Hard and soft glass are used in making heat lamps. The hard-glass lamp resists breakage if drops of water or other liquid strike the lamp while it is hot. The soft-glass lamp is cheaper, but it breaks easily if liquids are splashed on it while it is hot. The stamp in the center of the lamp indicates the kind of glass it is made of. A wire screen, such as $\frac{1}{4}$ -inch mesh hardware cloth, should be placed around the lamp to keep animals or objects from touching or breaking it. In case of lamp breakage, the screen will also prevent the hot broken glass and the white-hot electric element from falling to the floor.

HOW TO MAKE

LUMBER	CUT TO—	TO MAKE—
One piece 1" x 12" x 6'... One piece 1" x 4" x 10'... One piece 1" x 6" x 10'... One piece 1" x 4" x 5'... One triangular piece $\frac{1}{2}$ " plywood or other rigid material as available.	{ One piece 1" x 12" x 36" One piece 1" x 12" x 35 $\frac{1}{4}$ "... Two pieces 1" x 4" x 60".... Two pieces 1" x 6" x 51".... Three pieces 1" x 4" x 20".... 36" x 36" x 51".....	{ Sides A and B. Crossties C and D. Guardrail E. Guardrail braces. Top F.
One piece 2" x 4" x 6'...	{ Two pieces 2" x 4" x 20".... Two pieces 2" x 4" x 12"....	{ Cleats to hold brooder in place. Cleats to nail guardrail and keep in place.

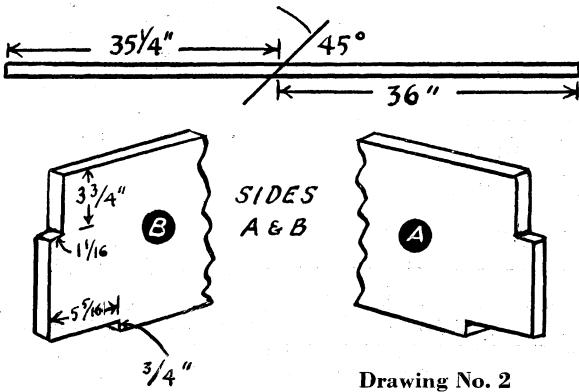
OTHER MATERIALS

One strip hardware cloth, $\frac{1}{2}$ " mesh, 16" x 16". $\frac{1}{4}$ -pound 6d common nails.
 1/4-pound 8d common nails. Wire staples, twelve, $\frac{1}{2}$ " long.
 14" RLM enameled reflector, cakepan, lard pail, or other available metal painted white for reflecting. Do not use reflectors less than 14" in diameter or less than 8" deep to bottom of lamp receptacle.
 100- or 150-watt lamp as required.
 10-foot heavy-duty types rubber-covered extension cord and locking adapter plug.
 ♦ double convenience outlet, locking type, to fit extension-cord plug.
 Tools: Light clawhammer, hand saw, tin cutters, steel square, keyhole saw.



Drawing No. 1

YOUR PIG BROODER



Drawing No. 2

CUT YOUR LUMBER

Cut the $1'' \times 12'' \times 6'$ board diagonally at 45° angle, in such a way as to make two boards *A* and *B* (see drawing 1). The longer edge of *B* must be $36''$ and the longer edge of *A* must be $35\frac{1}{4}''$. The opposite end of each board must be square. Notch beveled end of each piece at 45° angle, as shown in drawing 2.

Cut the $1'' \times 4'' \times 10'$ board into two $60''$ cross ties. Fit the cross ties into the notches cut in the sides of *A* and *B*. Corners are then cut off flush with the sides to give a finished job.

Cut guardrail into two pieces, each $1'' \times 6'' \times 52''$.

Cut three uprights to brace guardrail from $1'' \times 4'' \times 5'$ piece of lumber.

From the corner opposite the long side of the triangular plyboard, or other rigid board, draw a line to the middle of the long side.

Place the $14''$ reflector so that it is centered on this line but only $6''$ from the long edge of the top. Draw a circle around the reflector. Cut out this $14''$ circle, using a keyhole saw or other cutting device. The reflector should fit down into this hole tightly and rest on the hardware cloth which is stapled to the under side of the plywood top.

THEN ASSEMBLE YOUR BROODER

Set up sides *A* and *B*. The square end of the $1'' \times 12'' \times 35\frac{1}{4}''$ board *A* must be butted at right angles against the side of the board *B*, at its square end. Nail the sides together with 8d common nails.

Fit and nail cross ties into the notches cut in beveled end of pieces *A* and *B*. Saw off protruding ends flush with the sides.

Fit the roof into place as indicated. Nail to sides and top front brace with 6d common nails.

Staple the hardware cloth to the under side of the roof, covering the $14''$ hole.

Insert the lamp assembly and reflector in roof hole so that lamp cannot move.

Assemble guardrail from the three $1'' \times 4'' \times 20'$ pieces and the $1'' \times 6'' \times 52''$ pieces. Use $2'' \times 4''$ cleats nailed to sides of farrowing pen so guardrail can be nailed securely in place.

Nail guardrail securely to top of brooder.

Use $2'' \times 4'' \times 24''$ cleats nailed to sides of farrowing pen to hold brooder box down tight.

* NOTE.—If you wish to make a larger pig brooder, increase lumber dimensions $6''$ except for uprights on guardrail.

All heat lamps should be used with plain porcelain sockets which do not have pull chains or thumb switches. The lamp should be turned on and off by plugging in or removing the extension cord from a locking-type convenience outlet.

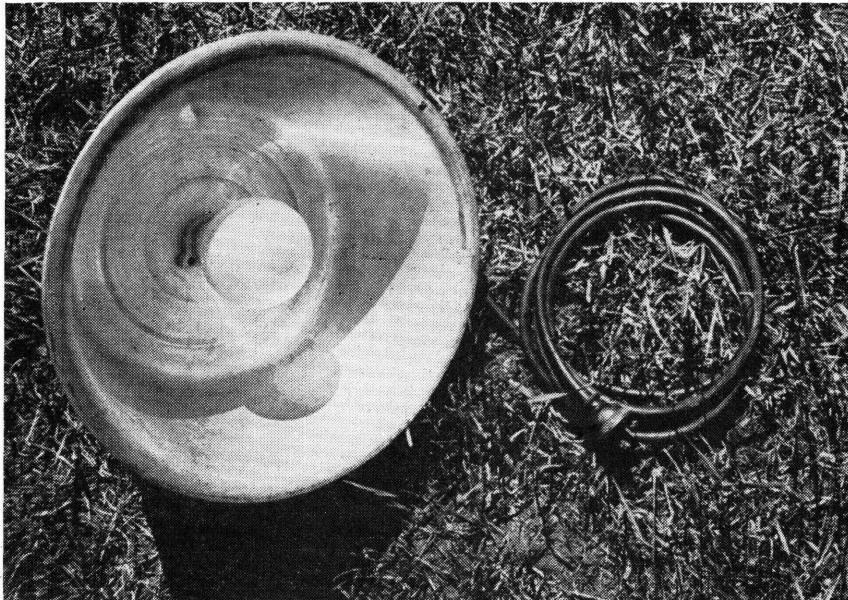
Do not use the extension cord to hang up the heat lamp or any other device. If a lamp is hung by the extension cord, the insulation and protective cover may soon be broken. This may cause a short circuit which will blow out a fuse, trip a circuit breaker, or cause a fire. Instead, use a bracket or suspension chain fastened to the weather-porcelain socket which holds the lamp. If a metal reflector is used, attach the supporting device to it.

Hang heat lamps 2 to 2½ feet high for young pigs and 3 to 4 feet for sows, depending on their height.

Provide a locking type of convenience outlet for each farrowing pen or individual hog house. A double outlet might serve two pens. Use the heavy-duty rubber or composition-covered type extension cords to prevent wear and abrasion. Partition off one corner of the farrowing pen with 5- or 6-foot planks to keep the sow away from the lamp. Leave creep space at the bottom so the pigs can run in and out of the corner at will. Hang the lamp in the corner space about 30 inches from the floor. The partition will keep the sow from hogging the heat. It will also help protect the pigs from being crushed by the sow. Keep all of the extension cord behind the partition and up off the floor so the sow and her pigs cannot reach it.

ADVANTAGES OF INFRARED HEAT-LAMP BROODING EQUIPMENT

1. Quick and easy to install.
2. Low initial cost and long life.
3. The extension cord, porcelain socket, and reflector, if any, can be used for other purposes when the farrowing season is completed.
4. The equipment can be moved easily and quickly from pen to pen. The lamp socket, reflector, and cord can be easily sterilized to prevent the spread of disease.
5. Heat lamps tend to keep the bedding drier, which improves the conditions under which confined animals must live.
6. The same equipment can be used for brooding pigs, lambs, calves, or chickens.
7. It will save an average of three more pigs in two litters.



An aluminum dishpan makes a good light and heat reflector. Use a "sign" lamp receptacle with attached wire leads to hold the bulb securely.

DISADVANTAGES OF INFRARED HEAT-LAMP BROODING

1. Heat stops immediately if lamp is out.
2. There is no box or hover to hold the animal heat of the pigs. This could result in chilling the young livestock in comparatively mild weather if the current is cut off.
3. Lamp breakage can occur more easily, which might result in fire if the pieces of hot element or broken glass fall into the bedding.
4. The cost of current will range from 50 cents to 1 dollar per litter, which is about twice the cost of current in hover brooders.

BILL OF MATERIALS FOR A HEAT-LAMP BROODER

1. One 250-watt R40 hard-glass heat lamp, or one 125-watt R40 soft-glass heat lamp.
2. One weatherproof socket with porcelain-lined receptacle and one-half-inch threaded nipple.

3. One male fixture loop with one-half-inch threaded stem.
4. Six or eight feet of light dog chain (to hang lamp to ceiling or rafters).
5. Ten feet of two-wire No. 14 size, stranded-rubber-covered, heavy-duty, type S flexible cord.
6. One locking-type two-wire cord cap with cord clamp for one-half-inch diameter cable.
7. One locking-type double convenience outlet and 4-inch cover-plate.

LAMB BROODERS

Either hover-type or heat-lamp brooders may be used for lambs. If the hover-type pig brooder is used, it should be raised to a height of 24 to 30 inches to give lambs room enough to stand. This can be done by removing the bottom cross tie of the triangular pig brooder and adding side boards 6 to 12 inches wide to the bottom side. Thus one hover can be used for both pigs and lambs.

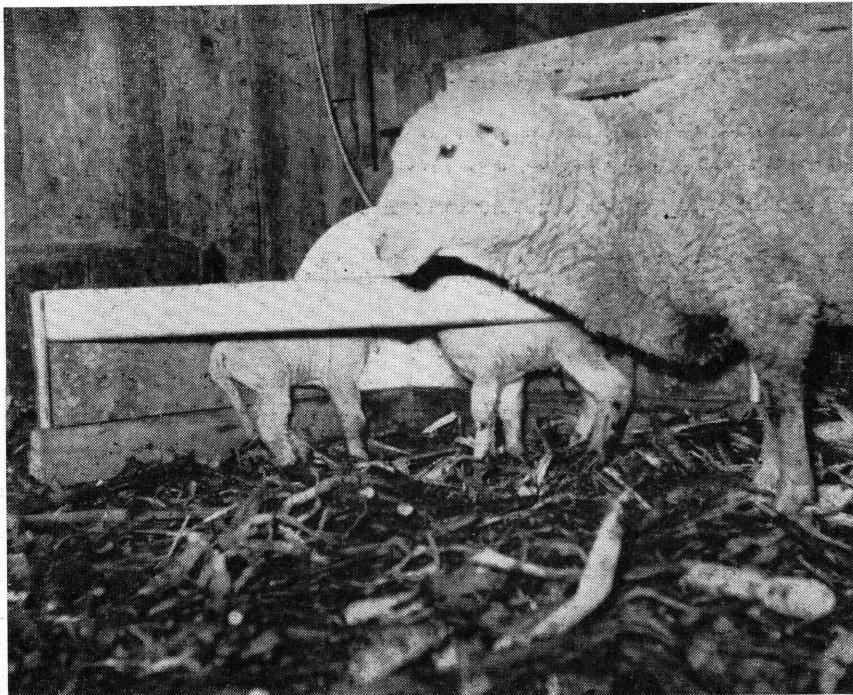
If a heat-lamp brooder is used, some care should be taken in adjusting the height of the lamp. If it is too low, the lambs can get their wool scorched. The fleece acts as insulation and their wool may char before they move away from the heat. For lambs, hang heat lamps 42 to 48 inches high. The ewe must be fenced away from the lamp.

Weak or chilled lambs should be placed in a brooder until they are dry and warm. A lamb generally needs only 1 day under a brooder to get strong enough to run with the flock. Do not completely separate the lamb from the ewe or she may disown it. This is especially important if the ewe has twins, or the lamb is put in the brooder immediately after it is dropped.

Have enough space for both lambs and ewe in the brooding pen, but hang the heat lamp behind the partition.

SUN LAMPS FOR ULTRAVIOLET LIGHTING

Many young animals born during the fall and winter are confined indoors for several months. Consequently, they miss the benefits of ultraviolet light from natural sunlight that enables them to make vitamin D within their bodies.



Sideboards placed beneath this pig brooder made it high enough for lambs. A 100-watt incandescent lamp is used to supply heat and light.

Window glass shuts out ultraviolet light rays. To overcome deficiency of this vitamin, fish oils or vitamin pills are added to their feed.

Mercury-Vapor sunlight lamps and fluorescent sunlight tubes produce an invisible ultraviolet light. This artificial light also enables animals to make their own vitamin D in their bodies. This will supplement, not replace, the need for the vitamin D given to them in their feed.

Some reports by farmers indicate that all confined animals respond to the effects of the sun lamp. Their coats appear to be glossier and they seem to be livelier and more alert. When sun lamps are used, animals are said to be less susceptible to colds and other physical ailments. Unfortunately, little research work has been done in this field.

The RS-275-watt sun lamp can be used in the regular lighting fixtures immediately over the livestock pens. This lamp can be used with pigs, lambs, calves, and older stock that may need ultraviolet

light treatment. It produces visible light, ultraviolet light, and a small amount of heat.

If all-night lights are used in the building, sun lamps could be used to supply lighting as well as ultraviolet rays. If this is done, it will be necessary to check animals exposed to the ultraviolet light to see that their eyes do not become inflamed. If ultraviolet lighting causes sore eyes, it will be necessary to reduce the number of hours exposure to the sun lamp.

Animals may need to be exposed several hours per day to the RS-275-watt lamp. This is due to the lower concentration of ultraviolet light when the lamps are in ceiling fixtures. Overexposure to sun lamps will result in sunburn (erythema) or the eyes may become irritated.

The RS lamps should be hung from 3 to 4 feet above the animals' backs. When they are placed higher, fewer lamps will be needed to cover an area but they must burn longer to give the desired effect. At a 3-foot height above the animal's back, a minimum of 1 hour exposure a day is recommended. Only one or two animals per lamp can be treated when the lamps are hung low. At the 5-foot height, several calves in small pens can be treated by burning the lamp several hours a day.

Fluorescent sun lamps produce 2 to 6 times more ultraviolet light per watt than RS sun lamps. But due to their lower wattage, they are used about the same length of time per day. Some manufacturers recommend using these lamps 10 to 12 hours per day.

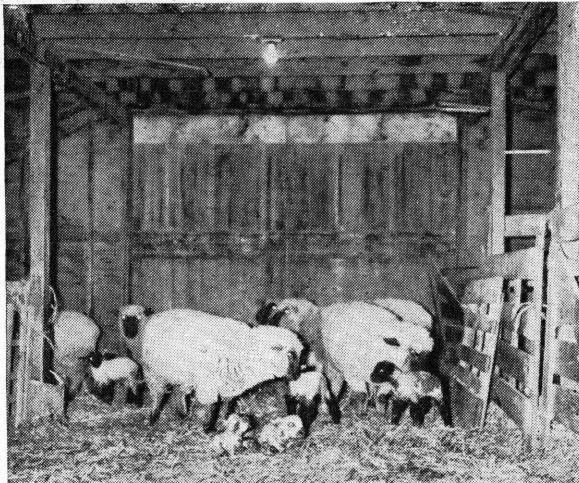
Fluorescent fixtures can be mounted at the ceiling or hung on chains of adjustable length for raising or lowering. The 48-inch tubes are recommended for most animal treatment. When a reflector is used with a sun lamp, it must be made of aluminum in order to reflect and concentrate the ultraviolet rays.

Sun-lamp equipment can be obtained as follows:

Sun Lamps:	Size (watts)	Cost
RS (Fits regular lamp sockets)	275	\$8.50
Fluorescent (Sun lamp) tubes:		
24-inch tube (Fit regular fluorescent fixtures)	20	4.50
48-inch tube (Fit regular fluorescent fixtures)	40	7.00

People should wear clear-glass goggles when working in areas lighted with sun lamps. Ultraviolet light cannot pass through ordinary glass. Consequently, the goggles protect the wearer. Ordinary eyeglasses give some protection but the ultraviolet rays can get into your eyes around the sides of the lenses.

General lighting equipment served for all-night lighting in this sheep barn.



ALL-NIGHT LIGHTS

A South Dakota farmer uses all-night lights on his ewes during the lambing season. He has a 75-ewe flock. He says that not a single ewe has disowned her lamb in the past 3 years. In 1951, 123 lambs were dropped. Not one died or was disowned.

He uses four 100-watt incandescent lamps mounted in reflectors. They are placed in each corner of the lambing pen which confines the ewes. The weak lambs and their mothers are moved to smaller pens containing lamb brooders. On this farm, barns and sheds are used for housing the flock while the lambs are young. In very severe weather, the ewes lamb in these buildings. The lighting system of the building is then used to supply all-night lights, as shown in the photograph.

This farmer says that ewes recognize their lambs by learning their odor immediately after birth. When lambing at night, the ewe and her lamb may become separated. The ewe then refuses to accept any of the newborn lambs as her own. This is especially apt to happen when twins are born. It is thought that the lamb born first gets lost in the dark while the second is being born. With all-night lights the ewe can see to keep track of the first lamb and they do not become separated. Consequently neither of the lambs is disowned. Certainly 100-percent acceptance of lambs by 75 ewes over a 3-year period would indicate that the idea had some merit. Like this

farmer, you may want to try all-night lighting for the flock to see what effect it has on your own farm.

The following summary shows 1951 results with night lights in the lambing pens and sheds on this South Dakota farm.

1. Seventy-five ewes in this flock bore 123 lambs with four sets of triplets.

2. No lambs were disowned and all lived to be weaned.

3. Four 100-watt lamps were used every night for 3 weeks. Two 100-watt lamps burned day and night for 8 days. Two 60-watt lamps were used in a shed at night for 2 weeks after the lambing was over.

4. Estimated cost of electricity for lighting—179.5 kilowatt hours at 3 cents per kilowatt-hour, \$5.38. Total electric bill for the entire farm during the lambing season was about \$19. The average for the preceding 4 months was about \$14 per month.



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